



IEEE 5G-IoT Summit Hammamet

Co-located with The Fourth International Symposium on Ubiquitous Networking (UNet 2018)

<http://www.5gsummit.org/hammamet/>

Program

Wednesday, May 02

08:00 - 17:30 – Registration

08:30 - 09:00 – Welcome and Conference Opening

09:00 - 10:30 – Session I

Room name

Session Chair: Name and Surname (Affiliation)

Title: Towards 5G Wireless Networks

Speaker: Angel Lozano (Pompeu Fabra University, Spain)

Abstract: With the 5th generation of wireless networks in the horizon, work is underway to define what such networks should look like. Challenges in the wireless arena keep mounting as user expectations grow with competing demands for higher bit rates, vastly enlarged capacities, vanishing latencies, and uniform user experiences. This lecture considers 5G, not from the perspective of a manufacturer, operator, or user, but from the perspective of a researcher. With this perspective, the presentation is organized around various reflections touching on aspects that relate to 5G but that also have broader conceptual implications.

Talk Title: Paving the Way for Context-Aware Holistic IoT Network

Speaker: Pr. Basem Shihada (KAUST University, Saudi Arabia)

Abstract: In this talk, I will take you through a quick journey in the IoT domain. I will identify the unique quality of service (QoS) needs of emerging IoT applications and propose SADIQ, which is a software-defined network (SDN) system that addresses these needs. SADIQ provides location-aware, context driven QoS for IoT applications by allowing applications to express their requirements using a location-based abstraction and a high-level SQL-like policy language, and the network to support these requirements through recent advances in SDNs. SADIQ is implemented using commodity OpenFlow-enabled switches and an open-source SDN controller and evaluate its effectiveness using traces from two real IoT applications. SADIQ system source code is made publicly available for the research community.

10:30 - 11:00 – Break

11:00 - 12:30 – Session II

Title: Research and Standard Trends in Broadcast for Future 5G Cellular Systems**Speaker: Dr. Belkacem Mouhouche (Samsung Electronics Research & Development, UK)**

Abstract: 5G systems have attracted a lot of focus recently. After the pre-standard period where the concepts of 5G and the impact on different verticals were clarified, 3GPP has started the specification of 5G. In December 2017, a first version of 3GPP Release 15 was published containing the first 5G standard. Release 15 focused on applications such as enhanced broadband, ultra-reliable communication and massive Machine Type Communication (mMTC). 3GPP is now considering other applications such as Broadcast for next releases. Broadcast (Point to Multipoint) is needed because of the huge traffic that media services generate. It is estimated that 60% of the traffic comes from video. This is particularly challenging for very popular live content (e.g. sports) or unpredictable events (e.g. breaking news) that tend to cause large traffic spikes. The increasing bit-rate demands of 4k UHD TV and, in the future 8k UHD TV, and the emerging new interactive services (e.g. augmented reality, virtual reality and 360° visual media) will further increase the demand on network capacity and performance. Furthermore, Point to Multipoint applications extend from media to other verticals such as autonomous driving and IOT. None of the existing networks, whether fixed, mobile or broadcast, has the capability to support this type of future demand on their own due to limitations associated with capacity, delay and cost of deployment. In order to prepare the point to multipoint standardization, a 5G-PPP project was launched recently, the 5G-Xcast, that will develop a solution targeting the aforementioned limitations and therefore addressing future demand, based on the key capabilities of 5G that by far exceed those of the legacy systems.

Title: Meeting 5G Traffic Demands in the Era of the Internet of Things**Speaker: Pr. Miguel López-Benítez**

Abstract: Communication networks no longer connect just people, but are evolving into billions of interconnected smart machine-type devices that enable automatic collection of data with little or no human intervention, leading to the so-called Internet of Things (IoT). Mobile communication networks are expected to become a key IoT connectivity technology, supporting 7 out of 30 billion IoT devices deployed by 2025. Mobile networks are designed and optimized for the traffic typically generated by a moderate number of human-driven, high data-rate services. IoT will introduce a much larger number of new machine devices with lower individual data rates but potentially much larger aggregated traffic demands, which will represent a radical change in network data traffic patterns. Current communication protocols and resource management algorithms are not optimized for IoT services and may lead to inefficient performance of mobile networks under IoT traffic. This talk will discuss the main features of IoT traffic and its statistical modelling along with the impact on current network design, and will explore how mobile networks might gain additional capacity in other spectrum bands to support the forecasted IoT traffic demands.

12:30 - 14:00 - Lunch Break**14:00 - 15:30 – Session III****Title: Adaptive Waveform Communications for the Efficient Provision of the Various Categories of QoS in 5G Systems****Speaker: Pr. Mohamed Siala**

Abstract: The current standardization activities of the upcoming 5G radio communication system classify the plethora of services to be offered into three categories, namely Enhanced Mobile Broadband, Massive IoT and Low Latency. Some of these services require clean communication channels, which can only be guaranteed by orthogonal or quasi orthogonal waveforms and perfect synchronization in time and in frequency. Some other services exchange sporadically small amounts of data and, as such, call for non-orthogonal and/or short duration waveforms capable of offering a satisfactory quality of service in the presence of time and frequency asynchronism. To respond to the various types of quality of service that must be offered by 5G systems, a battery of waveforms should be devised and used adaptively to match, in real time, the varying communication channel characteristics. In this talk, we start by showing that current 4G and DVT-T systems already deploy, quasi-statically, adaptive waveform communications, through the use of different Cyclic Prefix durations and/or different sub-carrier spacing and sub-carrier number. Afterwards, we provide a short presentation of the Ping-pong Optimized Pulse Shaping (POPS) paradigm, a powerful tool for the introduction of the new paradigm of advanced adaptive waveform communications (AWC) in 5G. We then examine some transmission configurations that illustrate the flexibility and simplicity of the POPS paradigm and its ability to optimize waveforms in different frameworks, ranging from FBMC/QAM and FBMC/OQAM systems and hexagonal/rectangular time-frequency lattice multicarrier systems to Flexible Zero Padding (FZP) multicarrier systems and robust interference-resilient single-carrier and OFDMA systems.

Title: Machine Learning for 5G Network

Speaker : Pr. Ridha Hamila

Abstract: The forecasted number of connected wireless IoT devices to the 5G network by 2022 is expected to reach more than 18 billions. Thus, a real revolution is needed to handle this terrific amount of network traffic. Consequently, intelligent and self-sustained radios and network equipment's, having cognitive functions capable to mimic and learn from their environments and act on their own without humans intervention, is a must.

15:30 - 16:00 – Break

16:00 - 18:00 – Session IV

Room name

Session Chair: Name and Surname (Affiliation)

Title: 5G and IoT Wireless Technologies - Key Drivers for the Development of Smart Cities and Communities in the Fourth Industrial Revolution Era

Speaker: Pr. Sofiène Affes

Abstract: In the digital economy of the 21st century, wireless has evolved beyond the traditional ICT sector to become one of the key drivers for developing new intelligent applications of this technology in all fields and areas of life such as transportation, security, health, energy, urban planning, infrastructures, manufacturing, etc. This crucial digital transformation promises countless business opportunities, more individual empowerment and responsible governance, better sustainable development, etc. This presentation examines new technological challenges, new application-specific integration issues, and emerging research-training requirements posed by this vibrant paradigm shift in the ICT sector. This brief review will be articulated from the perspective of the research-training program PERSWADE (« Pervasive and Smart Wireless Applications for the Digital Economy »), the first of its kind in Quebec and Canada <www.create-perswade.ca>. The second part of this presentation exposes the new 5G and IoT wireless technologies as key factors in the development of smart cities and communities in the upcoming fourth industrial revolution era. It then presents the new R&D initiatives envisioned on 5G and IoT, technologies aiming to empower more engaged citizens and communities in new worlds of digital societies and sustainable economies. More specifically, for 5G, we will focus on hybrid progressive deployment of wireless

access virtualization (WAV) with leveraged combining of cloud, fog, and edge or legacy networks and the design of user-centric WAV architectures on both uplink and downlink. As far as IoT is concerned, we will direct our attention on intra-node distributed cooperative communications and artificial intelligence (AI)-based localization.

Panel: Evolution, Promises, and Future of 5G-IoT